



U.S. Department
Of Transportation

Research and
Special Programs
Administration

Memorandum

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**ADMINISTRATIVE
RECORD**

To: Jim Christiansen, RPM, EPA Region 8

From: John McGuiggin, Jessica Paddock, and Paul Lang

CC: Courtney Zamora, Tim Wall, Dave Schroeder, Geoff McKenzie, and Scott Supernaugh

Date: 4/23/03

Re: Libby Asbestos Project:
I) Cost-Benefit Analysis: Disposal of Contaminated Soils, Lincoln County Landfill v. W.R. Grace Mine
II) Residential Remediation Planning: Vacuum Boxes and Team Specifications

Background:

The purpose of this technical memorandum is two-fold. First, the memorandum identifies and compares estimated disposal costs for contaminated soil at the Lincoln County Landfill (landfill) and the W.R. Grace mine (mine). As part of this analysis, the cost-effectiveness of disposing contaminated soils at the landfill in conjunction with the disposal of vermiculite-containing insulation (VCI) and asbestos-containing material (ACM) is presented. This memorandum outlines the various estimated costs associated with operations and management of both sites and offers disposal options.

Second, the memorandum, analyzes the volume of contaminated material that will be generated, the need to provide the appropriate quantity of vacuum boxes and the most cost-effective way to do both, acquire and utilize the vacuum boxes.

Part I: Disposal of Contaminated Soils

Remediation Property Estimates (Technical Information):

This disposal analysis is based on a 3-year schedule during which 900 of a total requirement of approximately 1350 properties are set as the next clean-up goal. Properties are classified as shown in Table 1:

Table 1: 3-year Program Property Classifications

Remediation Category	Working Requirement	Initial 3-Year Program	Follow-on Requirement
Exterior	450	225	225
Interior	675	450	225
Exterior + Interior	225	225	0
Total	1350	900	450

Volume estimates are described below in Table 2. From an overall "best guess" scenario, the total volumes of VCI, ACM, and soil is approximately equal to 184,275 cubic yards (cy). This total volume estimate exceeds the landfill capacity of 173,400 cy by 10,875 cy. All landfill volume estimates include a 20% contingency and 25% soil cover.

Table 2: Estimated Volume Calculations for Interior and Exterior Residential Removals

<i>Interior Volume Estimates</i>	Per House	Per Month	Per Year	Per Contract (3-Year)
VCI Volume (cy)	12	225	2700	8100
# Properties Complete	-	19	225	675
ACM Volume (cy)	10	188	2,250	6,750
Total VCI + ACM (cy)	22	413	4,950	14,850
<i>Exterior Volume Estimates</i>	Per House	Per Month	Per Year	Per Contract (3-Year)
Soil Volume (cy)	240	3,000	36,000	108,000
# Properties Complete	-	13	150	450
<i>Total Volume Estimates</i>	Per House	Per Month	Per Year	Per Contract (3-Year)
Total VCI/ACM + Soil (cy)	262	3,413	40,950	122,850
plus 20% Contingency	-	-	-	24,570
plus 25% Soil Cover	-	-	-	36,855
Total Volume Estimates (cy)	-	-	-	184,275

How does this compare to what we've seen

Way High garden

<i>Class IV Landfill Specs</i>	Per Cell	Total Cells
Current Volume (cy): incl. soil cover	43,350	173,400
Estimated Landfill Volume Deficit	-10,875	-
Adjusted Volume with Add'l Cell (cy): incl. soil cover	43,350	216,750

Cost:

Landfill Costs:

Landfill costs were developed assuming one dumping event per month, based on an eight-month operation year for soil and a twelve-month operation year for VCI and ACM. Initial equipment cost analyses proved that staging the equipment at the landfill was more cost-effective than mobbing and demobbing the equipment every month. To stage the equipment at the landfill would set estimated equipment costs at around \$29,908/month. The estimated costs to mob/demob the equipment every month for a monthly dump event are estimated at around \$43,611/month (see Appendix A for detailed estimated cost data). Other benefits of having one mob/demob equipment event per season and one dumping event per month, include the following:

- Cost-effectiveness also increases as you sum the benefits associated with the timesavings of the on-site support needed.

- Project may run the risk of not having equipment available when needed.
- The equipment needed for this activity may be taking away the equipment and/or labor from another task associated with the project.

Costs are broken down by landfill disposal of a) Interior VCI/ACM b) Soil c) All – Interior VCI/ACM and Soil (see Appendix B for detailed estimated cost data). In determining the estimated cost of soil disposal, some equipment and labor costs that were previously accounted for in the disposal of VCI/ACM, were thus discounted, as the landfill is considered to be currently operating for those costs. However, soil disposal increases the operation of the landfill to six days per week, as soil disposal is a daily operation.

Mine Costs:

Mine costs for disposal of soil were developed for a daily, eight-month operating period, with one mob/demob event. However, the eight-month estimated costs were divided over a twelve-month period as the appendix data shows. See Appendix B for detailed estimated cost data.

Disposal Options:

The following Table 3 outlines the soil disposal options available by 3-year estimated contract cost and estimated cost per cubic yard.

Table 3: 3-year Summary of Estimated Contract Disposal Costs and Options

OPTION I:	Estimated Contract Operations Costs (3-year) w/ Tipping Fee (where applicable)	Estimated Cost/Cubic Yard
Operate Mine for Soil (3 Years)	\$ 2,142,750.00	
Operate Landfill for VCI/ACM Only (3 Years)	\$ 1,559,245.50	
Total:	\$ 3,701,995.50	\$ 30.13
OPTION II:		
Operate Landfill for VCI/ACM and Soil (3 Years)	\$ 4,327,069.50	
Construction of add'l cell if needed	\$ 161,263.00	
Total:	\$ 4,488,332.50	\$ 36.54
OPTION III:		
Operate Landfill for VCI/ACM and Soil (3 Years)	\$ 4,327,069.50	
No construction - volume over-estimates	\$ -	
Total:	\$ 4,327,069.50	\$ 35.22
OPTION IV:		
Operate Mine for Soil (1 Year)	\$ 714,250.00	
Operate Landfill for VCI/ACM (1 year)	\$ 519,748.50	
Subtotal:	\$ 1,233,998.50	
<i>then-</i>		
Operate Landfill for VCI/ACM and Soils (2 years)	\$ 2,884,713.00	
Subtotal:	\$ 2,884,713.00	
Total:	\$ 4,118,711.50	\$ 33.53

Summary:

Option I:

- Costs: Least expensive operating option.
- However, on-site management costs are not accounted for here. On-site personnel will be responsible for coordinating two dumping locations once a month.
- Higher risks for personnel entering the mine over a period of 3 years.

Option II:

- Costs: Most expensive option, \$6.41 more expensive per cy than the cheapest option (Option I).
- Construction costs of additional cell are based on ¼ of costs incurred from the initial 4 cell landfill construction and design.
- Benefit: the county can use excess capacity once remediation efforts have been completed.
- Option dependent on available capacity. As of now 6 of the 10.4 acres are established for landfill cells.
- Requires coordination with the Montana Department of Environmental Quality (MTDEQ).

Option III:

- Costs: Third least expensive option, \$5.09 more expensive per cy than Option 1 (the least expensive option).
- Least viable option as it is doubtful that volume estimates are substantially inaccurate.

Option IV:

- Costs: Second least expensive option, \$3.40 more expensive per cy than Option I (the least expensive option).
- Mine to be operated for one year to compensate for the additional volume (10,875 cy) that will not be available for disposal in the landfill.

NOTE:

- It is assumed that initial management costs are comparable for options I, III, and IV. Option II's management costs are suspected to be higher as coordinating the construction and design of the additional cell will require greater time commitments.
- Option I or IV seem to be the most viable and efficient options based on estimated costs.

Potential Concerns:

The following outlines some potential issues or thoughts that may impact final soil disposal location(s) decisions or that may need to be researched further for a more complete cost analysis.

- If EPA starts remediation work at the mine, this will impact use of this area for soil disposal.

- When clean-up work continues at the Flyway Property next season, the distance increases for disposal if the landfill option is implemented.
- The cost of surveying the landfill.
- The soil that was excavated for construction operations is available for daily cover use.
- Daily soil cover is not accounted for in the monthly disposal volume calculations located in Appendix B.

Part II: Residential Remedial Operational Planning

Quantities - Remediation Teams and Vacuum Boxes:

In order to keep this analysis consistent with the above analyses, this analysis will also be based on a 3 year, 900 property analysis (as described in Table 1).

Remediation Teams:

Interior-Only Removals:

Interior-only removals have been calculated for a 3-year period as requiring approximately 6 teams doing 26 remediations/season in order to reach the 450 interior-only clean-up goal in 3 years.

Exterior-Only Removals:

Exterior only removals have been calculated for a 3-year period as requiring 4 teams conducting 19 remediations/season in order to reach the 225 exterior-only clean-up goal in 3 years.

Both: Interior and Exterior Removals:

Combination properties requiring both interior and exterior removals require a schedule of 7 teams conducting 11 remediations/season in order to reach the 225 exterior and interior clean-up goal in 3 years.

Vacuum Boxes:

Figure 1 demonstrates the build-up of VCI and other ACM vacuumed from residences. The "Full" values represent the quantity of 25 cy vacuum containers that accumulate between weekly, bi-weekly, monthly, or bi-monthly disposals. These values are derived from the quantities of material expected to be vacuumed by teams performing removals at interior-only, exterior-only, and combination properties during summer portions of the 3-year removals program shown in Table 4. The interior-only values of Table 4 comprise the total accumulation of vacuumed waste during winter periods precluding exterior removals.

Table 4: Quantity of Vacuum Boxes Generated per Week

	Interior Only	Exterior Only	Exterior-Only	Total
Full Vacuum Boxes	2.6	1.1	2.8	6.6
Cubic Yards of VCI/ACM	65.7	28.3	70.8	164.7

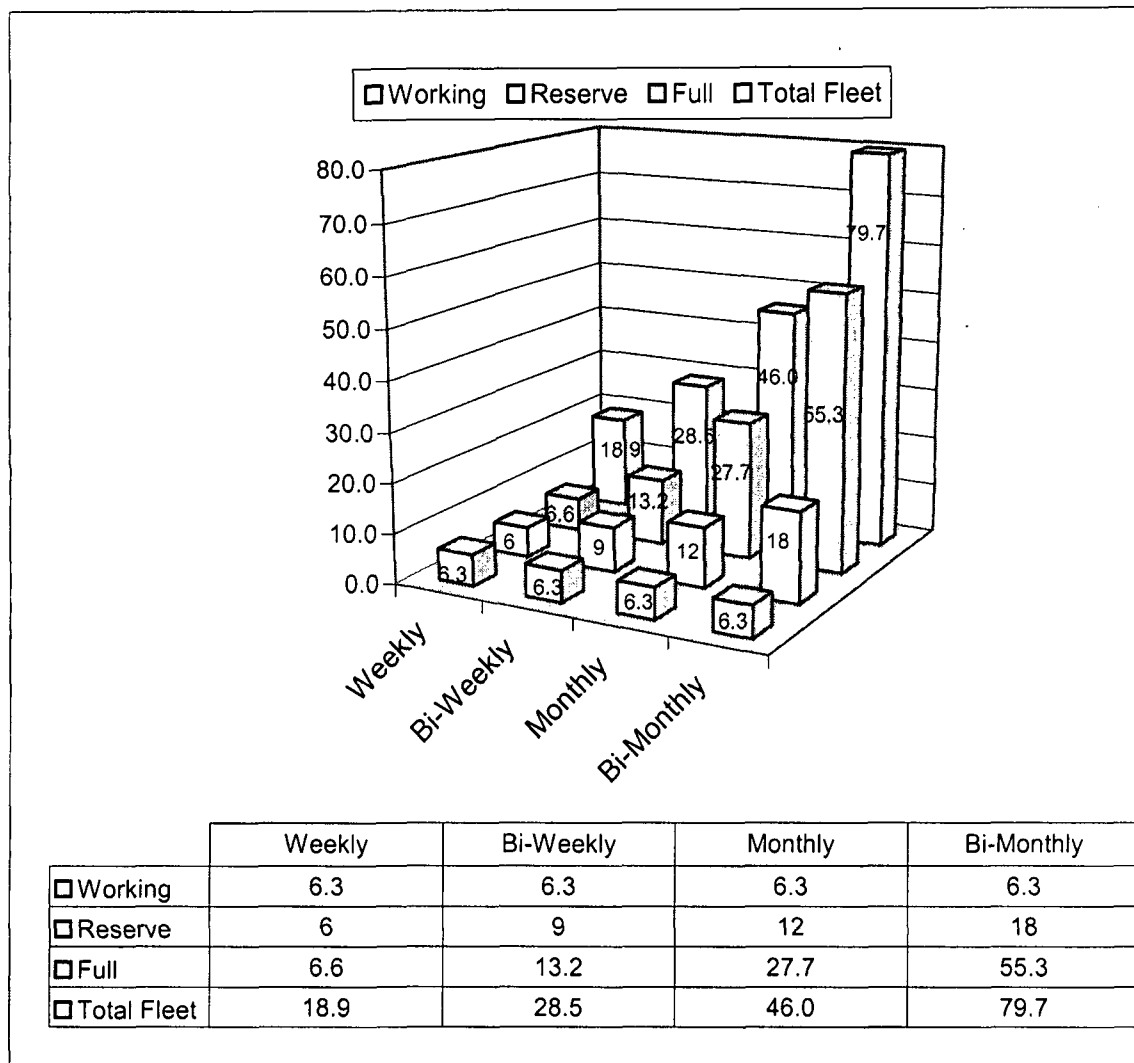


Figure 1: Vacuumed Waste Accumulation for Various Disposal Strategies

Dumping Events and the Cost of Vacuum Boxes:

The following Table 5 represents an estimated cost analysis conducted from current market data. The number of vacuum boxes have been extracted from Figure 1 and inserted into Table 5 for the analysis. It can be seen from the table that it is more cost-effective to buy the vacuum boxes at each respective dumping frequency than to rent them for the duration of the contract.

Table 5: 25 CY Vacuum Containers -- Rent or Buy

	6-month Rental	Purchase	12-month Rental	24-month Rental	36-month Rental
Est. monthly rental cost, or purchase cost (ea)	\$899	\$7,977	\$899	\$899	\$899
Annualize	12		12	12	12
Year(s)	0.5		1	2	3
1 container	\$5,394	\$7,977	\$10,788	\$21,576	\$32,364
19# of containers	19	19	19	19	19
Subtotal	\$102,486	\$151,563	\$204,972	\$409,944	\$614,916
29# of containers	29	29	29	29	29
Subtotal	\$156,426	\$231,333	\$312,852	\$625,704	\$938,556
46# of containers	46	46	46	46	46
Subtotal	\$248,124	\$366,942	\$496,248	\$992,496	\$1,488,744
80# of containers	80	80	80	80	80
Subtotal	\$431,520	\$638,160	\$863,040	\$1,726,080	\$2,589,120

Note: Subtotalled costs do not include the costs of delivery, cleaning, maintenance if necessary, etc.

Dumping Events and the Cost of O&M at the Landfill:

The following Table 6 outlines the quantity of vacuum boxes necessary to complete the work as expressed in Figure 1, and then provides a cost difference as dumping events are varied from the initially established monthly dumping event schedule. These estimated costs are then compared to the estimated costs to operate the landfill at this frequency of dumping events. It can be seen the best cost savings is seen with the weekly dumping event relationship.

Table 6: Estimated Costs of Varying Frequency of Dumping Events as Compared to Changes in Estimated Costs of O&M at Landfill

Estimated Cost Details:	Dumping Events			
	Weekly	Bi-Weekly	Monthly	Bi-Monthly
Total Fleet of Vac Boxes:	19	29	46	80
Cost to Purchase Vac Boxes:	\$ 151,563.00	\$ 231,333.00	\$ 366,942.00	\$ 638,160.00
Difference in Vac Box Fleet Cost (Varying Frequency of Dumping Events):	\$ 39,885.00	\$ 79,770.00	\$ 135,609.00	\$ 271,218.00
Est. Costs for O&M of Landfill: VCI/ACM	\$ 53,824.38	\$ 46,816.38	\$ 43,312.38	\$ 84,824.75
Cost of Varying Frequency of Dumping Events - Est. Costs for O&M of Landfill: VCI/ACM =	\$ (13,939.38)	\$ 32,953.63	\$ 92,296.63	\$ 186,393.25

Potential Concerns and Additional Information:

The following outlines some potential issues or thoughts that may impact this analysis.

- It currently states in the Lincoln County Class IV Asbestos Landfill Operations Plan, January 2003, no more than 100 cy of waste will be stored in the storage area at any one time (page 3-1). One 25 cy container for county residents would allow only 3 other containers of VCI/ACM in the storage area. This limit on vacuum boxes/roll-off containers presents a storage problem considering the amount of vacuum boxes projected.
- When 40 properties are complete, approximately 35 full vacuum boxes and 190 cy of bagged ACM will need to be disposed of.

Volpe Estimate
Estimated Monthly Costs to Dispose of Interior ACM and VCI at Lincoln County Landfill (12 Months)

DESCRIPTION	Unit	Rate	Hours	Labor Cost	Material Qty	Material Cost	Equipment Qty	Equipment Cost	Mat./Supp Qty	Other Cost	TOTAL
Labor											
Equipment Operator/Watertruck Driver (2)	HR	\$ 25.00	48	\$ 1,200.00							\$ 1,200.00
Laborer (2)	HR	\$ 23.00	48	\$ 1,104.00							\$ 1,104.00
Subtotal Labor											\$ 2,304.00
Equipment											
Backhoe Loader (includes labor)	CY	\$ 2.49					413	\$ 1,027.13			\$ 1,027.13
Backhoe Loader (mob/demob)	EA	\$ 4,000.00					0.125	\$ 500.00			\$ 500.00
Tractor, crawler, w/ bulldozer	Month	\$ 20,000.00					1	\$ 20,000.00			\$ 20,000.00
Tractor, crawler, w/ bulldozer (mob/demob)	EA	\$ 4,000.00					0.125	\$ 500.00			\$ 500.00
Decon Station	Month	\$ 2,500.00					1	\$ 2,500.00			\$ 2,500.00
Pressure Washer	Month	\$ 900.00					1	\$ 900.00			\$ 900.00
Water Truck	Month	\$ 2,200.00					1	\$ 2,200.00			\$ 2,200.00
Water Truck (mob/demob)	EA	\$ 650.00					0.125	\$ 81.25			\$ 81.25
Water (5,000 gallons)	Month	\$ 1,200.00					1	\$ 1,200.00			\$ 1,200.00
PPE	Month	\$ 1,000.00					1	\$ 1,000.00			\$ 1,000.00
Subtotal Equipment											\$ 29,908.38
Other											
Trucking Costs from site to landfill (2 Trucks)	Hour	\$ 75.00							16	\$ 1,200.00	\$ 1,200.00
Subtotal Other											\$ 1,200.00
Tipping Fees											
	CY	\$ 24.00							413	\$ 9,900.00	\$ 9,900.00
Monthly Dumping Event	\$	43,312.38									
Bi-Weekly Dumping Event	\$	46,816.38									
Weekly Dumping Event	\$	53,824.38									
Bi-Monthly Dumping Event	\$	84,824.75									

Estimated Cost Details:	Dumping Events			
	Weekly	Bi-Weekly	Monthly	Bi-Monthly
Total Fleet of Vac Boxes:	19	29	46	80
Cost to Purchase Vac Boxes:	\$ 151,563.00	\$ 231,333.00	\$ 366,942.00	\$ 638,160.00
Difference in Vac Box Fleet Cost (Decreasing Frequency of Dumping Events):	\$ 39,885.00	\$ 79,770.00	\$ 135,609.00	\$ 271,218.00
Est. Costs for O&M of Landfill: VCI/ACM	\$ 53,824.38	\$ 46,816.38	\$ 43,312.38	\$ 84,824.75
Cost of Varying Frequency of Dumping Events - Est. Costs for O&M of Landfill: VCI/ACM =	\$ (13,939.38)	\$ 32,953.63	\$ 92,296.63	\$ 186,393.25
Est. Costs for O&M of Landfill: VCI/ACM & Soil	\$ 36,049.09	\$ 72,098.19	\$ 144,196.38	\$ 288,392.75
Cost of Decreasing Frequency of Dumping Events - Est. Costs for O&M of Landfill: VCI/ACM & Soil =	\$ 3,835.91	\$ 7,671.81	\$ (8,587.38)	\$ (17,174.75)